

S/N: 10/567,259
Page 2 of 11

RECEIVED
CENTRAL FAX CENTER
SEP 15 2009

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently amended) An enclosed lens type retroreflective sheet comprising a surface layer including at least one layer, a focusing layer containing glass spheres, and a metal reflective layer on the back side of the focusing layer,

wherein the glass spheres are disposed at random locations in the thickness direction of the focusing layer,

the glass spheres include a first glass sphere group that provides reflective performance at a small observation angle of 2° or less and up to a large incidence angle of from 5° to less than 90° and a second glass sphere group that provides reflective performance at a larger an observation angle greater than 2° and up to a large incidence angle of from 5° to less than 90° in the same focusing layer,

the focusing layer for the second glass sphere group is thinner at the glass spheres than a focus formation position for the glass spheres,

the surface layer is present at positions over the first and second glass sphere groups, and the metal reflective layer is formed on the back side of the focusing layer to follow the shape of the glass spheres.

2. (Previously presented) The retroreflective sheet according to Claim 1, wherein the first glass sphere group comprises spheres in contact with the surface layer, and the second glass sphere group comprises spheres located away from the surface layer.

3. (Previously presented) The retroreflective sheet according to Claim 1, wherein the metal reflective layer of the first glass sphere group is formed at the focus formation position of the glass spheres.

4. (Previously presented) The retroreflective sheet according to Claim 2, wherein

S/N: 10/567,259

Page 3 of 11

the focusing layer formed in the form of concentric circles on the glass sphere surfaces of the glass spheres in contact with the surface layer has a thickness at which the maximum reflective performance is exhibited at an observation angle of 0.2° and an incidence angle of 5°, the thickness of the focusing layer of the glass spheres located away from the surface layer is less than the thickness of the focusing layer of the glass spheres in contact with the surface layer, and the glass spheres located away from the surface layer exhibit retroreflective performance at a relatively larger observation angle than the glass spheres in contact with the surface layer.

5. (Previously presented) The retroreflective sheet according to Claim 2, wherein the proportion of glass spheres in contact with the surface layer is from 50 to 90 weight percent of the total glass spheres.

6. (Previously presented) The retroreflective sheet according to Claim 1, wherein the refractive index of the glass spheres is within a range of at least 2.10 and no more than 2.40.

7. (Previously presented) The retroreflective sheet according to Claim 1, wherein the glass spheres have a median diameter within a range of at least 35 μm and no more than 75 μm , and at least 80% of the glass spheres have a median diameter within a range of $\pm 10 \mu\text{m}$.

8. (Previously presented) The retroreflective sheet according to Claim 1, wherein the main component of the resin that makes up the focusing layer is a polyvinyl acetal resin.

9. (Original) The retroreflective sheet according to Claim 8, wherein the polyvinyl acetal resin is a polyvinyl butyral resin with a degree of polymerization of 500 to 1500.

10. (Original) The retroreflective sheet according to Claim 9, wherein the polyvinyl alcohol units of the polyvinyl butyral resin account for at least 17 wt% and no more than 23 wt%.

11. (Previously presented) The retroreflective sheet according to Claim 9, wherein the glass transition point (Tg) of the polyvinyl butyral resin is at least 60°C and no higher than 80°C.

S/N: 10/567,259

Page 4 of 11

12. (Previously presented) The retroreflective sheet according to Claim 9, wherein the hydroxyl groups in the polyvinyl alcohol units of the polyvinyl butyral resin have been crosslinked with an amino resin, and the focusing layer is one that does not dissolve when immersed for 1 minute in toluene, for 1 minute in xylene, or for 10 minutes in methanol.
13. (Previously presented) The retroreflective sheet according to Claim 1, wherein the mixing proportions of the glass spheres and the resin weight of the focusing layer are such that the glass spheres account for 1.5 to 3.7 weight parts per weight part of resin.
14. (Previously presented) The retroreflective sheet according to Claim 1, wherein the focusing layer contains a non-silicon-based anti-foaming agent in an amount of 0.01 to 3.0% of the resin weight of the focusing layer.
15. (Original) The retroreflective sheet according to Claim 14, wherein the non-silicon-based anti-foaming agent is an alkyl vinyl ether copolymer.
16. (Original) The retroreflective sheet according to Claim 1, wherein the surface layer includes at least one coating layer, or at least one coating layer formed over a resin sheet, and the coating layer is a composition obtained by blending at least one resin component selected from among fluoro-olefin copolymers containing a reactive functional group, polyester resins, alkyd resins, polyurethane resins, vinyl resins, and acrylic polymers containing a reactive functional group, and at least one curing agent selected from among amino resins, epoxy resins, polyisocyanates, and block polyisocyanates, and/or curing catalyst.
17. (Original) The retroreflective sheet according to Claim 1, wherein the surface layer includes at least one coating layer, or at least one coating layer formed over a resin sheet, and the outermost layer of the coating layer is a fluoro-olefin copolymer composition.
18. (Original) The retroreflective sheet according to Claim 16, wherein the resin component of the coating layer is a fluoro-olefin copolymer containing a reactive functional group.

S/N: 10/567,259

Page 5 of 11

19. (Canceled)

20. (Previously presented) The external illumination system according to Claim 22, wherein the illumination source emits light that is incident on the sign face at an incidence angle of at least 0° and no more than 50° to the sign face, and

the sign face exhibits reflective performance of at least 0.07 at an observation angle of 35° when reference light A whose color temperature is 2856K is incident thereon at an incidence angle of 35°,

where "incidence angle" refers to the angle formed by the irradiation axis of projected light and the face center normal line of the retroreflective sheet, "observation angle" refers to the angle formed by the irradiation axis of projected light and the observation axis, and "reflective performance" refers to a coefficient calculated from the following equation:

retroreflective coefficient $R' = I/ES \cdot A$

R' : retroreflective coefficient

ES : illuminance (lx) on a plane perpendicular to the incident light when light is incident at a center position of a test piece

A : test piece surface area (m^2)

I : calculated from the following equation at the luminosity (Cd) toward the observation axis produced by a test piece

$$I = Er \cdot d^2$$

where Er is the illuminance (lx) on a light receptor, and

d is the distance (m) between the test piece surface center and the light receptor.

21. (Previously presented) The external illumination system according to Claim 22, wherein, when reference light A whose color temperature is 2856K irradiates the sign face from the outside, the reflective performance at an observation angle of 5° and an incidence angle of 50° is at least 0.5, and the reflective performance at an observation angle of 40° and an incidence angle of 50° is at least 0.055.

22. (Currently amended) An external illumination system, comprising

S/N: 10/567,259

Page 6 of 11

a sign having a sign face including an enclosed lens type retroreflective sheet comprising a surface layer including at least one layer, a focusing layer containing glass spheres, and a metal reflective layer on the back side of the focusing layer,

wherein the glass spheres are disposed at random locations in the thickness direction of the focusing layer,

the glass spheres include a first glass sphere group that provides reflective performance at a small observation angle of 2° or less and up to a large incidence angle of from 5° to less than 90° and a second glass sphere group that provides reflective performance at a larger an observation angle of from 5° to less than 90° and up to a large incidence angle of from 5° to less than 90° in the same focusing layer,

the focusing layer for the second glass sphere group is made thinner at the glass spheres than a focus formation position for the glass spheres,

the surface layer is present at positions over the first and second glass sphere groups, and the metal reflective layer is formed on the back side of the focusing layer to follow the shape of the glass spheres, and
an external illumination source,

wherein the external illumination source is disposed at a fixed distance from the sign and the distance from the illumination source to the sign face is within a range of at least 1 m and no more than 100 m.